Centre for
Resource Studies

Queen's University
Kingston, Ontario

Annual Report for the Period 1 May 1986 — 30 April 1987

Centre for Resource Studies

Origins and Objectives

The Centre is a cooperative research institute established at Queen's University in 1973. Funded by The Mining Association of Canada and the federal Department of Energy, Mines and Resources, and co-sponsored by Queen's University, its function is to improve understanding of the complex questions underlying issues of mineral resource policy (excluding oil and gas). The purposes of the Centre are accomplished through a program of research and publication, and by providing opportunities for liaison between representatives of federal and provincial governments, the industry, labour, universities and other interested groups.

Summary of Activities 1975-87

In 1975, a multi-disciplinary research program was launched on the national impact of mining, to study the effects of the mining industry on the economy and on other aspects of Canadian society. This program was completed in 1978. Late in 1976 a second major research thrust was undertaken, with the objective of examining the mineral-related policies and programs of the federal and provincial jurisdictions in Canada. Studies arising from both programs have been published as monographs and working papers, the first appearing in 1976. As of April 1987, eighteen monographs and thirty-eight working papers have been published on these and other topics. In 1981 a new series of publications entitled Technical Papers was introduced, and seven in this series have been published so far. In addition, twenty-six issues of CRS *Perspectives* have been distributed to our mailing list which now has approximately 4,500 names.

In 1977 the Centre held the first of a series of CRS Policy Discussion Seminars. Each seminar brings together, in a constructive working environment, invited representatives of a diversity of interests to discuss a topic of current policy concern. Each gives rise to a set of proceedings which contains the text of papers presented at the seminar, as well as a digest of discussions. Seventeen seminars have been held up to April 1987.

Further details of CRS activities may be found in later sections of this report. The Executive Director and Board of Directors wish to acknowledge the contribution of CRS staff, associates, and committee members. Without their strenuous efforts and generous allocation of time, the accomplishments of the past year would not have been possible.

1986-87 Activities of the Centre

The Centre continued to focus on international trade and the competitive position of the Canadian mineral industry in 1986-87. Completed studies looked at the role of international commodity organizations and at Japanese coal procurement policies. New studies undertaken in this area are Margaret Slade's study of the mechanisms of commodity exchanges and producer pricing, Carmine Nappi's study of long-run structural changes in demand for several key metals, and the study by Zacher and Webb of Canadian foreign policies with respect to markets and marketing arrangements for mineral exports and some mineral and agricultural imports. A number of other studies in international trade issues were carried over from previous years. The 1986 CRS Policy Discussion Seminar looked at future prospects for the gold sector, including global supply and demand issues.

The Centre's core staff pursued their long-term research and data collection activities in mineral economic and mineral policy fields, while also carrying out shorter-term projects of current interest. Dr. Anderson's work included a look at Canadian-U.S. trade relations, drawing on his interests in broad issues in Canadian mineral economy. Dr. Mackenzie published a study on the economic impact of the location of Canadian mineral developments, while continuing to expand and update his data base of Canadian mineral deposits and related computer modeling capability. Dr. Yudelman continued with his work on business-government relationships, with a particular interest in the lessons that might be learned from experiences in Australia and South Africa. Mrs. Wojciechowski concentrated mainly on issues related to productivity and technological innovation, in addition to following federal and provincial initiatives affecting the mineral sector.

External researchers covered both international and more domestically-focused issues, including Pacific Rim markets, protectionism and subsidies, taxes and tax reform, productivity, and infrastructure policies. Project-by-project information is provided in the following section.

In December 1986, David Yudelman left the Centre for Resource Studies to accept an appointment as Manager, Legislation and Government, in the Pacific Affairs Department of the Bank of Montreal. Dr. Yudelman joined CRS in 1982 as a Senior Research Associate. Margot Wojciechowski was appointed Associate Director of the Centre in January 1987. Mrs. Wojciechowski has been with the Centre since 1978, first as a Research Assistant and later as Assistant Director.

Research

Research Completed Since May 1986

Research Funded by CRS

Industrial Policy in the Mineral Sector, David L. Anderson, Centre for Resource Studies. This study explored the recent Canadian experience with micro-economic policies, or industrial policies, designed to encourage specific policy outcomes in the mineral sector. Particular emphasis was placed on initiatives designed to achieve employment and regional growth targets. Given current interest in the inter-relationship between industrial policy and trade negotiations, this study is of interest to those involved directly or indirectly in trade and mineral policy matters.

International Mineral Consultative Organizations, W. Keith Buck, Centre for Resource Studies. As the Centre's Distinguished Visitor, Mr. Buck completed a study of international consultative arrangements vis-a-vis their applicability to the Canadian mining industry, drawing on his background as Secretary General of the Lead Zinc Study Group, his participation in other international consultative organizations, and his wide knowledge of the mineral industry. The study was published in September 1986.

The Value-Added Tax Option: Implications for the Canadian Mining Industry, Brenda Joan Dyack, Consulting Economist, Edmonton. This study had two purposes: to describe the business transfer tax (BTT), a variation of the value-added tax; and to investigate how a BTT would affect the Canadian mining industry. Various types of value-added taxes and their problems of implementation are reviewed, with emphasis given to areas of importance to the mining industry. Where data are available, numerical examples are used to illustrate the method of calculation and the impact of the tax on a representative mining firm. It was published in November 1986.

The Contribution of Mine Infrastructure to Economic Development in North Australia, Ciaran O'Faircheallaigh, Australian National University. The objective of this research was to establish the extent to which infrastructure developed to permit mining in North Australia has contributed to more broadly-based economic growth. The study provides a method for evaluating the pros and cons of government support for infrastructure in remote developments that would be useful in considering future developments in remote regions in Canada or elsewhere.

Innovation in the Mineral Industry: Opportunities and Strategies for Canada, Margot J. Wojciechowski, Centre for Resource Studies and Peter R. Richardson, School of Business, Queen's University. Originally commissioned by the Ministry of State for Science and Technology and Energy, Mines and Resources, this study provides background information on the Canadian mineral industry, an overview of the current state of technology in all aspects of the industry, from exploration to physical metallurgy, and on "emerging" technologies of special interest. It identifies opportunities for innovation in the industry, and makes recommendations aimed at taking advantage of the available opportunities.

Externally Funded Research

A Framework for Assessing the Impacts on Exploration, Development, and Mining of Alternative Fiscal Incentives, Brian W. Mackenzie, Centre for Resource Studies. This study, funded by the Government of British Columbia, provides a framework for assessing the impacts of alternative fiscal incentives on exploration, development, and mining. The incentives include geological data base development, exploration grants or loans, and tax incentives. Dr. Mackenzie also assesses the public and private costs and benefits of such incentive programs.

Mining Sector Directory, Margot Wojciechowski and Kelly Strueby, Centre for Resource Studies. The Canadian International Development Agency had asked CRS to prepare a directory of information on the professional workforce in the Canadian mineral sector as background information for CIDA's mineral-related

activities. The directory is in the form of a computer data base and will provide workforce information on operating companies, consultant and professional services and institutions.

Research in Progress

Research Funded by CRS

Economic Analysis of Western Canadian Export Coal Supply, David L. Anderson, Centre for Resource Studies. This study will examine the economic structure of the western Canadian export coal industry. It will address the merits of the industry's rapid development since 1960, especially in the post-1980 period. In this regard, particular attention will be placed on the debate surrounding the northeast British Columbia coal project. The study will also describe and assess the problems currently facing export coal producers and outline the industry's future prospects.

Quantitative Assessment of the Economic Impact of Mining on the Canadian Economy, David L. Anderson, Centre for Resource Studies. This study draws on existing data sources (primarily computer data bases) to demonstrate the impact of mining on Canada's economy, especially in comparison with other resource industries such as forestry and petroleum.

Australian and Canadian Export Coal: A Policy Analysis of Relative Competitiveness, David L. Anderson, Centre for Resource Studies; and Donald W. Barnett, Macquarie University, Australia. The objective of this study is to assess the relative competitiveness of Australian and Canadian export coals in the Pacific Rim market. The analysis focuses on the domestic cost structure of each industry with special attention given to operating costs, non-profit and profit-based taxes, domestic transportation levies, and infrastructure financing arrangements.

Analysis of the Canadian Mineral Economy, David Anderson and Brian Mackenzie, Centre for Resource Studies. This study, addressed primarily to an international audience, will examine the broader issues of Canada's mineral economy. It will provide a brief historical review of these issues and explain the key factors which impinge on the international competitiveness of Canadian mining. Through the use of computer simulation techniques, this study will illustrate the impact of taxation, transportation, productivity, and exchange rates on the financial health of the industry.

Productivity in the Canadian Mineral Industry, Frank Anton, University of Calgary. This researcher has been awarded a grant-in-aid of research to revise and update a study of "Productivity in the Canadian Mineral Industry" undertaken for Energy, Mines and Resources Canada in 1973-74. Two productivity models will be compared and analyzed, and the policy implications for government and industry will be considered. Innovation techniques for improving productivity will be presented in detail to serve as a guide for labour and government.

Economics of Gold Exploration and Mine Development in Quebec, Michel Bilodeau, McGill University. This study focuses on the compilation of a comprehensive data base on significant gold deposits located in Quebec. It is an extension of the base metal data base compiled by the researcher and B.W. Mackenzie of CRS. In the first phase of the study, actual data will be compiled on a deposit-by-deposit basis assuming present-day economic and technological conditions. The second phase consists of refining and adapting the generalized costing relationships in the economic evaluation model which is used in conjunction with the base metal deposit data. The third phase consists of the preliminary analysis of the data base, given current gold price forecasts. Finally, the economics of gold exploration in Quebec will be examined by combining this information with the total gold exploration expenditures compiled for the same time period.

Evaluating the Restructuring Strategies of Canadian Mining Firms in the Recession 1977-1985, John Bradbury, McGill University. This project will evaluate the restructuring and winding-down strategies deployed by mining companies during the period 1977-79 through to 1985-86. A mail survey of a sample of mining companies in eight different mining regions and sectors will

ascertain strategies during this period of crisis in the industry. Data sets in Statistics Canada on overall expenditures by mining type and general data sets available at EMR in Ottawa on investments in different aspects of mining will be reviewed. These two data sets will be compared as well as the corporate responses across Canada in eight different mineral types.

An Assessment of the Effects of Countertrade on the Canadian Mining Industry, Andrew F. Cooper, University of Waterloo. During the 1980s there has been a marked increase in the number of countries actively promoting countertrade as a means of conducting international transactions. This project will study the impact of countertrade on the Canadian mining industry and assess the extent of Canadian involvement in techniques which fall into this category. The researcher will first provide an overview of the nature and scope of countertrade in the international mining industry, then focus on the impact of global countertrade on Canadian policy and practice, and finally, assess the involvement of Canadian mining companies (and others whose activities might have a bearing on the mining industry) in countertrade.

The Challenge to Canadian Mineral Exports to the USA: A Comparative Assessment of Protectionist Pressure in Copper, Potash, and Uranium, David G. Haglund, Centre for International Relations, Queen's University. This study will explore the extent to which Canadian export interests in three commodities - copper, potash, and uranium - are or may be affected by the apparent increase in U.S. Congressional sentiment for protectionism. The author began to examine the protectionist challenge as part of a broader research project on "Canadian Interests and U.S. Mineral Policy" with the assistance of a CRS grant-in-aid in 1984. The proposed research will develop further some of the issues examined in the earlier study and extend the scope of the inquiry to include copper and potash.

Flow-Through Share Financing, Basil A. Kalymon, Faculty of Management Studies, University of Toronto. This project will update previous studies with regard to the level of activity in flow-through financing, document the alternative mechanisms available, and analyze the investment incentives created by flow-through shares. The researcher will draw conclusions as to the future potential and limitations of flow-through financing. Reviewers comments on a draft manuscript have been received.

Exploration of the Korean Market for Canadian Minerals, Yul Kwon, University of Regina. In this study, Dr. Kwon will investigate the trade opportunities available to Canada in the rapidly expanding industrial economy of South Korea. With the prospect of static markets for Canadian minerals in the USA, EEC, and Japan, Canada must investigate new trade opportunities. It is expected that South Korea, whose economy has grown at a rate of 8 percent per annum over the last 20 years, will be the "Japan" of the future.

Economic Analysis of Canadian Gold Supply, Brian Mackenzie and Michael Doggett, Centre for Resource Studies. A comprehensive mineral deposit data base is being assembled, documenting short-, medium-, and long-term aspects of Canadian gold supply, concentrating on trends during the 1946-84 period. This information is being organized on micro-computer spreadsheets for evaluation and analysis. It is expected that this work will be integrated with the economic evaluation procedure and base metal data base which has been under development at CRS since 1975. Papers on long-term exploration aspects of the topic were presented at the short course on Gold Exploration 1985, held at Queen's University in May, and at the CIM Symposium on Gold in the Western Shield, held in Saskatoon in September 1985.

Economic Comparison of Mineral Supply Potential in Northern and Southern Canada, Brian Mackenzie and Leo Verleun, Centre for Resource Studies. This study compares endowment and locational characteristics of exploration and mining in the northern territories with those of the more-accessible southern provinces. The first stage of the study was completed under contract to Indian Affairs and Northern Development Canada in March 1984. A more thorough analysis was subsequently carried out in Leo Verleun's masters thesis, completed in late 1984. This work has been further extended and will be published soon.

Economic Comparisons of Base Metal Exploration in Australia and Canada, Brian Mackenzie, Centre for Resource Studies, and Roy Woodall, Western Mining Corporation. This study compares the economics of base metal exploration in Australia during the period 1955-78 with similar assessments made in Canada for the 1946-77 period. The comparison is based on documented historical experience, evaluated in the context of current economic outlook conditions. Mineral exploration economics is measured by the relationship between real exploration expenditures, and the value of economic deposits discovered as the result of that exploration. A paper focusing on the productivity aspect of the topic was presented at a meeting on the economics of mineral exploration convened by the International Institute for Applied Systems Analysis, Laxenburg, Austria, in December 1983. The results are being updated and the analysis extended in a manuscript being prepared for CRS publication.

Federal and Provincial Taxation of Resource Industries: Impact and Implications for Reform, Jack Mintz and Robin Boadway, Queen's University. The purpose of this study is to describe and assess how corporate and provincial mining taxes influence the investment decisions and production structure of Canadian mining firms. While earlier literature tried to evaluate the effect of taxation by measuring the average tax rate, this study measures the "effective" tax rate (the tax imposed on the marginal project). In addition to providing an analysis of the impact of taxes on mining firms, the researchers will propose measures for tax reform based on their findings.

Metals Demand and the Canadian Mineral and Metal Industry: Structural Changes and Policy Implications, Carmine Nappi, University of Montreal. The objectives of this work are: to examine the extent to which there is a long-run structural change in the Western economies demand for aluminum, copper, lead, nickel and zinc; to explain that change in assessing the relative importance of the income effect and the conservation-structural effect; to evaluate the implications of structural changes in metals demand on market structure, on firms' pricing and R&D; and finally to study its possible effects on the formulation of a mineral policy for Canada and its province.

The Impact of State-Owned or State-Assisted Mines and Smelters on International Markets, Ciaran O'Faircheallaigh, Australian National University. This study will examine the implications for producers in "free market" situations (i.e. in Canada and Australia) of competing with producers whose input costs and/or output levels are influenced by noncommercial criteria. The researcher will concentrate mainly on copper, iron ore, and aluminum. He visited CRS for three months in 1986 to collect data and conduct interviews on the Canadian situation.

The USSR's Mineral Policy and its Implications for Canada, Miron Rezun, Bishop's University. This study will examine the extent to which Canadian mineral interests are, or could be, affected either negatively or positively by Soviet mineral policy. Secondly, it will outline plans, policies, or proposals the USSR has been, or might be, considering in a possible "resource war" that could affect Canada.

Management in the Mineral Industries, Peter Richardson, School of Business, Queen's University. This study will look at the applicability of modern management concepts and practices to management in the resource industries. This background research may lead to a CRS seminar or a more detailed research project.

The Impact of Alternative Pricing Systems on the Canadian Mineral Producers, Margaret Slade, University of British Columbia. There are a multitude of unresolved issues concerning the mechanisms of commodity exchanges and producer pricing. This study is a first step in the determination of whether commodity exchanges fairly determine the price of metals and should therefore be supported. Through interviews and library research the researcher will focus on the way a particular commodity is sold and the specific institutional arrangements which distinguish this market from others. A statistical analysis of pricing and production trends will attempt to uncover general trends and similarities across commodities. Where pricing pat-

terns are very different, an attempt will be made to discover why.

Foreign Direct Investment by the Canadian Nonferrous Metal Industry, Elizabeth Urquhart, Independent Researcher. This is a systematic study of direct investments made abroad by Canadian nonferrous mining companies. It will include both stocks and flows of all foreign direct investments related to mining, such as exploration, mining, refining, processing and marketing, as well as investments in other sectors such as manufacturing.

The Changing Transportation Environment of the Canadian Mineral Industry, Iain Wallace, Carleton University. This study will investigate and analyze critical issues in Canadian mineral transportation. Relevant data and documentary material will be gathered from shippers, carriers, government and industry spokemen, and relevant agencies. Where appropriate, the study will quantify and project trends.

Mineral Policy Update 1985-86, Margot Wojciechowski, Centre for Resource Studies. The fifth in this annual series, this study will document the mineral policy and program changes made during 1985-86 by the federal government, the territories, and the provinces.

Alternative Models for Industry-Government Relationships in Mining, David Yudelman, Centre for Resource Studies. This study will examine the relationship of government and the mining industry in Australia and South Africa. Special reference will be made to the relevance (if any) for Canada of the Australian and South African models.

Business-Government Relations in Mining, David Yudelman, Centre for Resource Studies. This study will be a review of the literature on the relationship between business and government, with a primary focus on mining.

Canadian Policy Toward Instability in International Mineral Markets, Mark W. Zacher and Michael C. Webb, University of British Columbia. The primary objective of this study is to describe and explain Canadian foreign policies for dealing with instability in the markets of minerals that Canada exports and to evaluate their desirability and feasibility for Canada. A secondary objective is to analyze Canadian policies regarding international arrangements for a number of mineral and agricultural commodities that Canada imports. Particular attention will be given to international market conditions, the interests of Canadian producers and consumers, and the policies of other producing and consuming states. The study will encompass eight minerals that Canada exports: copper, iron ore, lead, nickel, potash, tungsten, uranium, and zinc. It will also include at least four commodities that it imports: tin, coffee, cocoa, and natural rubber.

Externally-Funded Research

Mine Discovery and Development in Ontario: Economic Guidelines for Government Policy, Brian W. Mackenzie, Centre for Resource Studies and Michel Bilodeau, McGill University. The objective of this research is to provide support for policy and planning within the Ministry of Northern Development and Mines. This will be accomplished by developing a deposit-specific data base and evaluation procedure for assessing the potential for discovering and developing metallic mineral deposits in Ontario. The project will update and extend an existing base metal data base; assess the economic characteristics associated with discovering and developing base metal deposits in Ontario; illustrate how this type of assessment can be used to evaluate government policy effects; and carry out a preliminary economic appraisal of the discovery and development of gold deposits in Ontario. The data base is being assembled.

Trends in R&D Funding and Education in Earth Sciences, Margot J. Wojciechowski and Susan Gentleman, Centre for Resource Studies. The Geoscience Council of Canada has commissioned a comparative study of R&D funding and education in the earth sciences in Canada and in a number of other mineral-producing countries. The study also looks at the economic contribution of earth sciences to the mineral industry, particularly to the mineral exploration sector.

New Publications

The following new publications arising from the CRS research and seminar programs were released during 1986-87.

Mine Infrastructure and Economic Development in North Australia, by Ciaran O'Faircheallaigh, was published in September 1986. This working paper gathers empirical evidence to establish whether mine infrastructure in remote areas has in fact contributed significantly to more broadly-based economic and social development. Use of special infrastructure items is reviewed and the employment structure of resource towns/regions is analyzed. It provides general framework for approaching the question of government support of infrastructure in remote developments.

Intergovernmental Mineral Commodity Arrangements, by W. Keith Buck, published in September 1986, brings together pertinent details on the post-World War II history and current status of intergovernmental commodity arrangements in the field of minerals. The study endeavours to highlight the clear distinction in form, operations and efficacy of the two main kinds of intergovernmental commodity arrangements: full-fledged commodity agreements with binding economic provisions such as those pertaining to price and supply management; and those arrangements which provide a forum for intergovernmental consultations and the enhancement of market transparency in the real world trading environment of the particular mineral concerned.

Value-Added Taxation: Issues and Impact for Canadian Mines, by Brenda J. Dyack, November 1986. This paper discusses a number of concerns that have been raised about value-added taxation's potential impact on the mineral industry. Its potential impact on profitability and on competitive position both domestically and in export markets are considered, as well as a wide variety of concerns about compliance costs and administrative complications. Overall, the analysis supports the view that the form of value-added tax presently proposed by the federal government, the business transfer tax (BTT) will be of net benefit to the industry.

Dyack provides examples of methods of calculation of the tax, which she finds will be much simpler to understand and administer than the manufacturers' sales tax (MST) which it is expected to replace. She also finds that replacement of the MST with the BTT will likely reduce the overall tax burden of the mining industry somewhat, as any MST that is presently hidden in the cost of production and not shifted to consumers will be eliminated.

Structural Changes in the World Mineral Industry: Implications for Canada, edited by Margot J. Wojciechowski, was released in September 1986. The volume contains the proceedings of the 15th CRS Policy Discussion Seminar. The seminar looked at changing supply and demand patterns in world mineral markets, both in general and for several specific commodities. Related economic, trade and currency-related issues were discussed and strategic responses were identified to assist the Canadian mineral industry in adjusting to the new circumstances.

Technology Policies in the Canadian Mineral Industry, edited by Margot J. Wojciechowski, published September 1986. This volume contains the proceedings of the 16th CRS Policy Discussion Seminar on technological challenges facing the Canadian mineral industry, and on corporate and public sector policies that might help to meet these challenges. Some presentations focused on barriers to innovation and technology transfer, and on how some of these barriers might best be overcome. Speakers also looked at the role of industrial and government research and collaboration, and a panel of experts spoke on the role of "external institutions" - universities, consultants, mining equipment companies and foreign-based multinationals - in upgrading Canadian mineral technology. In the course of discussions, participants identified a number of key areas in urgent need of support and attention, including: mining technology; new products and materials; marketing; and mining and process equipment, particularly at the demonstration and commercialization

stages. They also agreed that a coordinated and cooperative effort involving all interested parties on a national level, as proposed in the MAC technology initiative, could greatly improve the effectiveness and timeliness of innovation efforts.

An Analysis of Japanese Coking Coal Procurement Policies: The Canadian and Australian Experience, by David L. Anderson, February 1987. This study assesses the structure and impact of the Japanese coking coal procurement system on suppliers, especially those located in Australia and Canada. It also explores policy options available to producing nations to mitigate any adverse effects of collective buying practices on their economies. The author finds that the Japanese procurement strategy has been a mixed blessing for Australian and Canadian producers: it has fostered development which might not otherwise have occurred; but, on the other hand, the financial wisdom of some of the recent investments is increasingly suspect. Furthermore, it has led to public pressure for collective selling responses to ensure that the owners of the resources, the citizens of Australia and Canada, receive adequate compensation for exploitation of their nonrenewable resources. However, this study suggests that the nature of the coking coal market virtually precludes the introduction of effective anti-oligopsony policies.

The study draws attention to policy issues which have largely escaped serious public discussion in market economies. In their increasing desire to deregulate markets and to rely on the private sector to generate growth, governments should not lose sight of the fact that some export markets may not be conducive to individual selling activities. The coking coal market, however, does not appear to be a candidate for collective action.

Innovation in the Mineral Industry: Opportunities and Strategies for Canada, by Margot J. Wojciechowski and Peter R. Richardson, published March 1987. This study discusses special characteristics of the mineral industry that may influence its capabilities in R&D and innovation, and provides an overview of mineral R&D funding sources and recipients and brief descriptions of major R&D performers. The study then looks at the various major activities in the industry (exploration, mine design and development, mining, concentration and extractive processing, smelting and refining, and physical metallurgy) in terms of current technology and in terms of opportunities for significant technological innovation. Observations are offered on constraints and barriers to innovation in the Canadian mineral industry, and the study concludes with recommendations for industry and government that are designed to help in realizing the available opportunities.

A complete list of CRS publications appears at the end of this report.

Publications Outside CRS by CRS Researchers

David Anderson, "Demand for Coking Coal: Implications for Suppliers to the Japanese Market", *Raw Materials Report*, 4(3):35-49, 1986.

David Anderson, "Marketing Arrangements for Western Canadian Coking Coal", *Canadian Public Policy*, 12(3):473-483, 1986.

David Anderson, "Japan's Coking Coal Procurement System: Overview and Description", *Materials and Society*, 11(1): 11-22, 1987.

David Anderson, "Japan's Coking Coal Procurement System: An Explanation", *Materials and Society*, 11(1): 23-36, 1987.

Brian Mackenzie, "Locational Aspects of Mine Development Economics: Nova Scotia's Competitive Position in Canada", with D.W. Davis and M.L. Bilodeau, *CIM Bulletin*, April 1986, pp. 55-63.

Brian Mackenzie, "Economic Aspects of Mineral Resource Assessment", background paper, pp. 293-303 in *Prospects for Mineral Resource Assessment on Public Lands:* Proceedings of the Leesburg Workshop, S.M. Cargill and S.B. Green eds., U.S. Geological Survey Circular 980, 1986, 330 pp.

Brian Mackenzie, "Economic Guidelines for Gold Exploration in the Western Canadian Shield", pp. 114-143 in *Gold in the Western Shield*, L.A. Clark ed., Special Volume 38, The Canadian Institute of Mining and Metallurgy, Montreal, 1986, 537 pp.

Margot Wojciechowski, "Structural Change", *Northern Miner Magazine*, August 1986.

Margot Wojciechowski, "No Need to Fear this Tax", *Northern Miner Magazine*, December 1986.

Margot Wojciechowski, "Canada's Proposed Business Transfer Tax", *Policy Options*, March 1987.

David Yudelman, "Materials Policy: Canada", *Encyclopedia of Materials Science and Engineering*, 1986, pp. 2873-2878.

David Yudelman, "New Frontiers for Old: Black Migrants to the South African Gold Mines, 1920-85", *Journal of Southern African Studies*, vol. 13, no. 1, October 1986, pp. 101-124.

Presentations Made by CRS Researchers and Associates

(Based on CRS-related work)

David Anderson:

"The Subsidy Debate and U.S./Canadian Trade in Minerals: A Canadian Perspective", a paper presented at the Conference on Public Policy and Competitiveness of the U.S. and Canadian Metals Production, Colorado School of Mines, Golden, Colorado, 29 January 1987.

"The Centre for Resource Studies: A Business/Government/University Joint Venture", a paper presented to the National Conference on Research Centres, Social Science Federation of Canada, Ottawa, 14 March 1987.

Brian Mackenzie:

Principal lecturer, professional development seminar on "Mineral Project Evaluation Techniques and Applications", McGill University, February 14-16, 1986.

"Mineral Economics: Decision-Making Methods and the Mineral Industry", two-week course, Australian Mineral Foundation, Adelaide, August 20-29, 1986.

"Economic Guidelines for Exploration Planning", three-day seminar, Gold Fields Exploration, Canberra, August 13-15, 1986.

Canadian Delegate, Advisory Group Meeting on "Uranium Raw Materials - Economic Aspects of Exploration, Resource Appraisal, and Production", International Atomic Energy Agency, Vienna, June 24-26, 1986.

Brian Mackenzie (continued):

"Economic Aspects of Resource Assessment", with W.D. Watson Jr., discussion group report, pp. 83-93 in *Prospects for Mineral Resource Assessment on Public Lands:* Proceedings of the Leesburg Workshop, S.M. Cargill and S.B. Green eds., U.S. Geological Survey Circular 980, 1986, 330 pp.

"Economic Consequences of Mineral Deposit Location: Effects of the 1985 British Columbia Budget", with D.W. Davis and M.L. Bilodeau, paper presented at CIMM Tenth District 6 Meeting, Victoria, October 1986, 30 pp.

"Mineral Exploration Productivity: Focusing to Restore Profitability", paper presented at Fourth International Syposium, CIMM Mineral Economics Committee, Vancouver, November 1986, 34 pp.

"Effects of Location on the Competitive Position of Mineral Exploration and Development Opportunities in Canada", paper presented at Laurentian University, Sudbury, March 20, 1986.

"Effects of Location on the Competitive Position of Mineral Exploration and Development Opportunities in Canada", paper presented at Laurentian University, Sudbury, March 20, 1986.

"Effects of Location on the Competitive Position of Mineral Exploration and Development Opportunities in Canada", paper presented at CIM Branch, Thunder Bay, March 21, 1986.

"Economic Guidelines for Gold Exploration in Canada", paper presented at Gold Exploration 1986, Queen's University, April 14, 1986.

"Economic Guidelines for Gold Exploration in Canada", paper presented at Billiton International Metals, Leidschendam, The Netherlands, April 28, 1986.

"Economic Guidelines for Gold Exploration in Canada", paper presented at BP Minerals International, Newbury, U.K., May 1, 1986.

Peter Richardson:

"Overcoming the Obstacles to Technological Innovation in Mineral Processing", with Margot Wojciechowski, paper presented at CIMM Annual General Meeting, May 12-15, 1986, Montreal.

Margot Wojciechowski:

"Overcoming the Obstacles to Technological Innovation in Mineral Processing", with Peter Richardson, paper presented at CIMM Annual General Meeting, May 12-15, 1986, Montreal.

"Promoting Automation in Canadian Mining: Overview of the Constraints", paper presented at First Canadian Symposium on Automation in Mining, Sudbury, October 14-16, 1986.

"Policies for Innovation in the Metallurgical Industry", Department of Metallurgical Engineering, Queen's University, March 27, 1987.

CRS Policy Discussion Seminars

The CRS Policy Discussion Seminars are designed to bring together senior individuals from federal and provincial governments, corporations, universities, trade unions, and other interested groups to discuss current mineral policy issues. The informal atmosphere is conducive to the free and constructive exchange of views. In a typical two-day session, six or eight speakers present background information and views on the issue. Subsequent discussion in small groups and open sessions allow the participants to develop a mutual understanding of the problem and of other viewpoints, and to discuss potential solutions. The proceedings are published, including the papers and some analysis and conclusions.

Long-Term Prospects for Gold Mining

In October 1986, the policy workshop on Long-Term Prospects for Gold Mining was held at Queen's University. It brought together an interdisciplinary group of 40-45 planners, executives, and researchers from senior levels in the mining industry, government and university. The purpose of the workshop was to define and discuss what we need to know and what we can do to improve our understanding of the economic environment for gold mining, and the justification for investment in gold exploration and development, which will prevail to the turn of the century and beyond. The following papers were presented:

A Gold Market Overview: Trends in Supply and Demand, Jeffery Nichols
The Demand for Gold, Timothy Green
Mine Gold Supply to the Year 2000, Jim Fisher
Exchange Rates: Their Relationship with Gold and Critical Factors which Affect Currency Values, Martin Murenbeeld
Gold Price Forecasting: Commodity versus Monetary Perspective, Gerry Anders
Gold Exploration: Impact of Changing Geoscience Concepts and Technologies, Roy Woodall
Factors Affecting the Long-Term Prospects for South Africa's Gold Production, Danie Krige
Long-Term Breakeven Price for Canadian Gold Supply, Donald Cranstone, Brian Mackenzie, and Michael Doggett
Flow-Through Share Financing, Basil Kalymon

CRS Perspectives

Two issues of CRS *Perspectives* were published during the current year. *Perspectives* is an occasional bulletin edited by David Yudelman (to December 1986) that contains comment about the Canadian mineral industry, reviews, and news of CRS activities and publications. *Perspectives* is sent to the entire CRS mailing list of about 4,500 individuals and institutions interested in mineral policy issues.

Various aspects of mineral policy were discussed in the two issues of *Perspectives* issued in 1986-87. The September 1986 issue featured articles entitled "Commodity Agreements versus Study Groups: the Lessons of Tin", (Keith Buck, CRS Distinguished Visitor), and "VAT's Implications for Mining" (Margot Wojciechowski, CRS). *CRS Perspectives* for February 1987 contained an article entitled "Countervailable Subsidies and the Canadian Mineral Industry" (David Anderson, CRS), and an additional piece entitled "Policies for Innovation in the Canadian Mineral Industry" (Margot Wojciechowski, CRS).

Financial Arrangements

The Centre disbursed $150,809 on administrative activities and $371,557 on research activities during the year.

Continuing financial support is received from The Mining Association of Canada and Energy, Mines and Resources Canada. Funding from The Mining Association of Canada for 1986-87 was $195,000 per year ($78,000 for administration and $117,000 for research). This funding was matched by Energy, Mines and Resources Canada. A total of $29,226 was recovered from the sale of publications and seminar registration fees.

The Centre also seeks to serve the research needs of other agencies. In the current year, research support was received in the amount of $55,247 from agencies other than the Centre's permanent sponsors.

The Board of Directors

The Board consists of sixteen members. The Executive Director and the Advisory Council Chairman are ex-officio members. Of the remainder, four are appointed by The Mining Association of Canada, three by Energy, Mines and Resources Canada, and seven by the Principal of Queen's University. The Chairman is C. George Miller, Managing Director, The Mining Association of Canada. The chairman of the Research Advisory Committee has observer status at Board meetings.

The Board met twice during the year; the spring meeting was held April 30 in Kingston and the fall meeting took place October 30 in Toronto. On these occasions, the Board discussed a number of ongoing and potential research themes, the recommendations of the Advisory Council, and various administrative and policy matters.

Members of the Board who retired at the end of April 1987 are A.S. Manson, E. Black, and W. Curlook. New appointments for 1987-88 will be K. Hendricks (MAC), R. Smith and C.T. Asplund (Queen's). J. Beausoleil (EMR) and W.G. Jeffery (EMR) will be re-appointed.

Members of the 1986-87 Board of Directors were as follows:

D.L. Anderson
Centre for Resource Studies
J. Beausoleil
Department of Finance
E.R. Black
Queen's University
R.W. Boadway
Queen's University
K. Brewer (1987 only)
Energy, Mines and Resources Canada
P. Calder
Queen's University
W. Curlook
Inco Limited
W. James
Falconbridge Limited
H.E. Jamieson
Queen's University
W.G. Jeffery
Energy, Mines and Resources Canada
R.J. Keyes (observer)
Energy, Mines and Resources Canada
P.C. MacCulloch
Selco, Division, BP Resources Canada
A. Manson
Queen's University
C.G. Miller
The Mining Association of Canada
E.K. O'Brien (1986 only)
Inco Limited
D.G. Sinclair
Queen's University
R.Sully
Energy, Mines and Resources Canada
R.J. Uffen
Queen's University

Advisory Groups

The Advisory Council

The Advisory Council currently has a membership of sixty-three. All researchers associated with the work of the Centre are appointed to membership for the duration of the research or a minimum of one year. Other members, representing governments, industry, labour, the professions, and other interested organizations and groups, are appointed for a three-year term. The functions of the Council are to advise the Board, primarily on the research program, and to act as advisors to the Centre's staff.

The Council's 1986 annual meeting was held on May 1, under the acting chairman, Donn Morgan. Reports on the Centre's ongoing activities were received and discussed, along with presentations by a number of CRS and external researchers. Keith Brewer was chosen as chairman of the Council for 1987.

Advisory Council members for 1986-87 were as follows:

Appointed Members

*P. Andrews**
Energy, Mines and Resources Canada
W.J. Barbour
Noranda Mines Limited
J.L. Bonus
retired, the Mining Association of Canada
*K. Brewer** (chairman, 1987)
Energy, Mines and Resources Canada
P. Burnett
Canadian Arctic Resources Committee
P. Caragata
Toronto-Dominion Bank
J. Carman
Consultant
*C. Carson**
Cominco Limited
*D. Davis**
Mining Consultant
W. Dobson
C.D. Howe Institute
A. Dorr
Dept. of Industry, Commerce and Tourism, Quebec
D. Eldon
The Mining Association of Canada
B.E. Felske
Brian E. Felske and Associates
J.M Fleming
Mines and Energy, Newfoundland
D.M. Fraser
Denison Potacon Potash Company
J. Garnett
Ministry of Northern Development & Mines, Ontario
I. Haugh
ILAM Associates Limited
D. Hull
Energy, Mines and Resources Canada
*C.D. Hunt**
Canadian Institute of Resources Law
C. Isaacs
The Pollution Probe Foundation
C. Kang
Manitoba Energy and Mines
*R.J. Keyes**
Energy, Mines and Resources Canada
L. Kilburn
Prospectors and Developers Association
J. Kuryllowicz
Energy, Mines and Resources Canada
J. Larche
Prospectors and Developers Association
J. Lazarovich
Indian and Northern Affairs Canada
G. Mahoney
Energy and Resources, Quebec
W. Marsh
Retired, United Mines Workers of America
*R. Mason**
Queen's University
*G.B. McRae**
B.C. Ministry of Energy, Mines and Petroleum Resources

*D.L. Morgan**
Placer Development Limited
*C. Nappi**
University of Montreal
J.M. Newell
Victoria, British Columbia
*E.K. O'Brien**
Inco Limited
B. Partridge
Cominco Limited
*G. Peeling**
Energy, Mines and Resources Canada
C.W. Pelley
Queen's University
P. Reid
The Ontario Mining Association
R. Reid
Saskatchewan Energy and Mines
*R.E. Simeon**
Queen's University
K. Steeves
Teck Corporation
W.D. Tieman
Northern Development and Mines, Ontario
R.M. Woodbridge
Canadian Advanced Technology Association
*D.J. Worth**
Canadian Imperial Bank of Commerce

* Also a member of CRS Research Advisory Committee

Research Members

D.L. Anderson
Centre for Resource Studies
F. Anton
University of Calgary
D.W. Barnett
Macquarie University
M.L. Bilodeau
McGill University
W.K. Buck
Centre for Resource Studies
A. Cooper
University of Waterloo
A. Green
Queen's University
D. Haglund
Queen's University
B. Kalymon
University of Toronto
O.Y. Kwon
University of Regina
B.W. Mackenzie
Centre for Resource Studies
J. Mintz
Queen's University
C. O'Faircheallaigh
The Australian National University
T.A. O'Hara
Consultant
N.D. Olewiler
Queen's University
M. Rezun
Bishop's University
P.R. Richardson
Queen's University
M. Slade
University of British Columbia
E. Urquhart
Independent Researcher
I. Wallace
Carleton University
M.J. Wojciechowski
Centre for Resource Studies
D. Yudelman
Bank of Montreal
M. Zacher
University of British Columbia

The Research Advisory Committee

The Research Advisory Committee was formed in 1976 to advise the Board of Directors and executive director of CRS on research goals and priorities, and on the selection, formulation and direction of research projects. The committee consists of individuals knowledgeable about the mineral industry and research methods, chosen from industry, government, private consulting, and universities. The committee decides on the allocation of grants-in-aid of research and advises on the award of research contracts. In 1981 the committee members all joined the Advisory Council of CRS as well. Under the chairmanship of Robert J. Keyes, the Committee reviewed grant applications and project proposals submitted to the Centre during 1986-87. For a list of members (marked *), see Advisory Council list above.

CRS Personnel

Members of the Centre staff coordinate the program of external research, carry out studies in-house, edit and produce the Centre's publications, organize seminars and meetings, and provide staff services to the Board and Advisory Council. Other related professional activities include participation in conferences and seminars, speaking engagements and teaching, publication of professional writings, and consultation with other researchers.

During 1986-87, the staff and associates of the Centre were as follows:

Core Staff

David L. Anderson, Executive Director
Donna Beaubien, Publications Officer
Sandra Cantelon, Bookkeeper/Secretary
Brian W. Mackenzie, Senior Research Associate
Linda Noble, Departmental Assistant
Margot Wojciechowski, Assistant Director (to January 1987) Associate Director (from January 1987)
David Yudelman, Senior Research Associate (to December 1986)

Faculty Associates

Michel Bilodeau, Department of Mining and Metallurgical Engineering, McGill;
Alan Green, Department of Economics, Queen's University
David Haglund, Centre for International Relations, Queen's University
Nancy Olewiler, Department of Economics, Queen's University
Peter Richardson, School of Business, Queen's University

Distinguished Visitor

W. Keith Buck

Part-time Staff

In addition, many others have assisted in the work of the Centre at various times. The contributions of Kelly Strueby, Sandra Morris, Michael Doggett, Susan Gentleman, and Terry Bennett are gratefully acknowledged.

Complete Listing of CRS Publications

Following is a complete list of all CRS publications. Publications that are out of print (marked *) can be ordered from Micromedia Limited. All other publications can be ordered from:

Centre for Resource Studies
Queen's University
Kingston, Ontario K7L 3N6
(Telephone: 613-545-2553)
(Fax #: 613-545-6300)

Monographs and Collections

Conflict and its Resolution in the Administration of Mineral Resources in Canada, by R.M. Burns; 62 pages, 11 tables, 1976. (M-1, $5.00)

The Impact of the Mining Industries on the Canadian Economy, by R.W. Boadway and J.M. Treddenick; 116 pages, 15 tables, 1977. (M-2, $9.00)

The Transportation Impact of the Canadian Mining Industry, by A.I. Wallace; 154 pages, 17 tables, 1977. (M-3, $9.00)

Human Resources in Canadian Mining: A Preliminary Analysis, by J.A. MacMillan, G.S. Gislason, and S. Lyon; 174 pages, 48 tables, 1977. (M-4, $12.00)

Health and Safety in the Canadian Mining Industry, by G.W. Gibbs and P. Pintus; 248 pages, 58 tables, 1978. (M-5, $12.00)

The Canadian Nonferrous Metals Industry: An Industrial Organization Study, by E. Urquhart; 158 pages, 18 tables, 1978. (M-6, $9.00)

Economic Impacts and Linkages of the Canadian Mining Industry, by P.E. Nickel, et al.; 140 pages, 31 tables, 1978. (M-7, $6.00)

Environmental Impact of Mining in Canada, by E.A. Ripley, et al., 274 pages, 45 tables, 1978, reprinted 1982. (M-8, $15.00)

Effects of Taxation on Base Metal Mining in Canada, by B.W. Mackenzie and M.L. Bilodeau; 188 pages, 29 pages, 29 tables, 1979. (M-9, $9.00)

Gold: The World Industry and Canadian Corporate Strategy, by E. Cousineau and P.R. Richardson, 192 pages, 32 tables, 1980. (M-10, $14.00)

The Impact of Policy Change on Decisions in the Mineral Industry: The Case of Exploration in Manitoba, 1969-77, by B.E. Owen and W.J. Kops; 116 pages, 8 tables, 1980. (M-11, $9.00)

The Role of Mineral Taxation in Industry/Government Conflict: The Case of the Saskatchewan Potash Reserve Tax, by David L. Anderson, 135 pages, 41 tables, 2 illustrations, 1981. (M-12, $9.00)

Profitability in the Canadian Mineral Industry, by Charles H. Pye; 178 pages, 42 tables, 12 illustrations, 1981. (M-13, $14.00)

Foreign Investment Control in the Canadian Mineral Sector: Lessons from the Australian Experience, by David L. Anderson, 180 pages, 22 tables, 1983. (M-14, $15.00)

Financing Canadian Mining in the Eighties: Strategies for Action, edited by David Yudelman, 240 pages, with papers by B. Bradly, A. Dorland, J. Erola, P. Gillin, P. Glenshaw, S. Greenwald, B. Kalymon, P. MacCulloch, B. Mackenzie, K. Murphy, A. Powis, R. Sultan, and D. Yudelman, 1984. (M-15, $15.00)

National Resources and International Bargaining Power: Canada's Mineral Policy Options, by Patrick James Caragata; 190 pages, 1984. (M-16, $20.00)

Canadian Mineral Policy Past and Present: The Ambiguous Legacy, by David Yudelman; 188 pages, 1985. (M-17, $15.00)

An Analysis of Japanese Coking Coal Procurement Policies: The Canadian and Australian Experience, by D.L. Anderson, 221 pages, 1987. (M-18, $25.00)

Proceedings

No. 1 *Rate-of-Return Taxation of Minerals*, edited by P.R. Richardson and N.D. Olewiler, with papers by B.W. Mackenzie and M.L. Bilodeau, P.M.T. White, N.D. Olewiler, J.T. Cawley, and E.P. Gush; 109 pages, 1978. (P-1, $9.00)

No. 2 *International Competition and the Canadian Mineral Industries*, edited by C.H. Pye and M.J. Wojciechowski, with papers by H.C. Armstrong, H.T. Fargey, C.G. Miller, N.D. Olewiler and P.R. Richardson, D. Perlstein, and K.C. Hendrick; 109 pages, 1978. (P-2, $9.00)

No. 3 *Current Concerns in Mineral Policy*, edited by B.W. Mackenzie and C.E. McMurray, with papers by C.R. Archibald, W.J. Barbour, D.B. Brooks, J.S. Dowsett, J.M. Fleming, and G.A. Jewett; 75 pages, 1978. (P-3, $5.00)

No. 4 *Canada's Mineral Trade. Implications for the Balance of Payments and Economic Development*, edited by M.J. Wojciechowski, with papers by B.W. Wilkinson, D.J. McCulla, J.G. MacKinnon, A.G. Balogh, and W.G. Chambers and J.S. Reid; 113 pages, 1978. (P-4, $9.00)

No. 5 *Employee Relations Initiatives in Canadian Mining*, edited by M.J. Wojciechowski, with papers by W.J. Bennett, F.R. Nogas and J.P. Fulcher, W.F. Clarke, S.B. Jones, T.F. Cawsey and P.R. Richardson, and P. Warrian, 85 pages, 1979. (P-5, $5.00)

No. 6 *Junior Mining in Canada: The Problem of Investment and Securing Fair Returns*, edited by M.J. Wojciechowski, with papers by A.J. Freyman, B.A. Kalymon, J.D. Mason, D.W. Scrim, E.H. Neave and P.R. Richardson, and E.G. Thompson, 101 pages, 1979. (P-6, $9.00)

No. 7 *The Future for Junior Mining in Canada, edited by M.J. Wojciechowski*, with papers by Hon. J.A.C. Auld, J.L.C. Lyndon, N.B. Keevil Jr., D.G.C. Menzel, H.T. Fargey, A.J. Freyman, Hon. R. Hnatyshyn, J.C. Baillie, D.W. Scrim, J.P. Bunting, E.H. Neave and P.R. Richardson, L.A. English, M. St.-B. Harrison, R.H. Grasley, and Hon. F. Drea; 125 pages, 1979. (P-7, $12.00)

No. 8 *Mining-Linked Diversification of the Sudbury Basin Economy*, edited by M.J. Wojciechowski, with papers by D.C. Frith, J.P. Reny, A.I. Wallace, J.H. Holtby and L.C. Kitchener, 53 pages, 1980. (P-8, $5.00)

*No. 9 *The Changing Structure of the Canadian Mineral Industry*, edited by M.J. Wojciechowski, with papers by I.A. Stewart, R.F. Mikesell, R. Simeon, R. Keyes and J.M. MacLeod; 105 pages, 1980. (P-9, $10.00)

No. 10 *Northern Mining in the 80s*, edited by M.J. Wojciechowski, with papers by Hon. G. Braden; R.J. Cathro; D. MacKinnon; J. Smith; R.W. Stephenson; B.E. Novak; E.N. Doyle; J.R. Witty, J.E. Marshall; A.G. Gordon; J. McCormack; H.B. Hicks; J. Zigarlick; T. Shearcroft; Dr. W. Kupsch; Dr. J. Stabler, and Hon. J. Erola; 110 pages, 1980. (P-10, $9.00)

No. 11 *Skilled Manpower Shortages in the 1980s: Towards a Cooperative Solution*, edited by M.J. Wojciechowski, with papers by R.J. Gray, J.S. Reid, W.H. Digby, J.B. Hopkinson, A. Knoll, O. Tremblay, G. Betcherman, P.E. Womersley, M.J. Alton, V.C. Allman, C. Stairs, E.J. Weiss, and W.E. McBride, 116 pages, 1981. (P-11, $9.00)

No. 12 *Acid Rain Controls and the Economics of the Canadian Nonferrous Mineral Industry*, edited by M.J. Wojciechowski, with papers by J. Gerin, W.G. Deeks, P.R. Clarke, J.B. Hyne, H.T. Fargey, B.W. Mackenzie, and E.J. Ward; 90 pages, 1982. (P-12, $9.00)

*No. 13 *Mineral Policy Formulation: The Role of Scientific and Technical Knowledge*, edited by M.J. Wojciechowski, with papers by G.A. Jewett, H.D. Drechsler, P.G. Halkett, D.E. Bond, D.C. Findlay, W.G. Jeffery, L.G. Bonar, D.W. Dallas, and J. Zwartendyk, 135 pages, 1982. (P-13, $12.00)

No. 14 *Mining Communities: Hard Lessons for the Future*, edited by M.J. Wojciechowski, with papers by I. Haugh, R.P. Douglas, R. MacDonald, D. Brown, R.D. Glass and J. Lazarovich, W. Mulvihill, D. DePape, G. Paget and B. Walliser, and R. Roberts; 211 pages, 1984. (P-14, $20.00)

No. 15 *Native Participation in Mineral Development Activities*, edited by M.J. Wojciechowski, with papers by A. Clark and M. Lalonde, K.A. Graham, B.W. Mackenzie, C.D. Hunt, J-L. Blais, F.R. Joubin, E. Laliberte; 150 pages, 1984. (P-15, $10.00)

No. 16 *Mining Productivity*, edited by M.J. Wojciechowski, with papers by K. Stollery, B.W. Mackenzie, C.G. Miller, W. James, P. LePage, W. Curlook and E. Kossatz, K. Whitham, and P.R. Richardson; 187 pages, 1984. (P-16, $15.00)

No. 17 *Canadian Mining Taxation*, edited by M.J. Wojciechowski, with papers by G. Langlois, D. Williams, T. Enemark, P. Halkett, Roberta Albert, K. Service, K. O'Brien, R. Boadway and J. Mintz; 146 pages, 1985. (P-17, $15.00)

No. 18 *Structural Changes in the World Mineral Industry. Implications for Canada*, edited by Margot Wojciechowski, with papers by P. Crowson, S. Hunt, G. Haclin, J. Davies, D. Karvonen, G. Denis, D. Daly, D. Haglund, I. Bennett, G. Mahoney, K. Buck, 213 pages, 1986. (P-18, $20.00)

No. 19 *Technology Policies in the Canadian Mineral Industry*, edited by Margot Wojciechowski, with papers by R. Woodbridge, M. Wojciechowski, F. Pickard, D. Bevelander, J. Hood, W.G. Jeffery and J. Kuryllowicz, P. Richardson, J. Schade, W. Curlook and G. Miller, M. Sayer, G. Hatch, D. Hutchinson, and A. Molinari, 179 pages, 1986. (M-19, $20.00)

Working Papers

*No. 1 *An Analysis of the Recent Federal Tax Changes Affecting the Canadian Mining Industry*, by Jean-Thomas Bernard; 27 pages, 6 tables, 1977.

*No. 2 *Risk and Return in the Canadian Mining Industry*, by A.M. Rugman; 31 pages, 10 tables, 1977.

*No. 3 *Provincial Mineral Policies: Newfoundland, 1949-75*, by M.J. Prince, 67 pages, 7 tables, 1977.

*No. 4 *Provincial Mineral Policies: Quebec 1945-75*, by S. Guindon; 49 pages, 1 table, 1977.

*No. 5 *Provincial Mineral Policies: Ontario 1945-75*, by R. Hynes; 48 pages, 4 tables, 1978.

*No. 6 *Provincial Mineral Policies: Saskatchewan, 1945-75*, by R.C. Murray; 64 pages, 1978.

*No. 7 *Provincial Mineral Policies: New Brunswick, Nova Scotia 1945-77*, by A. Koven; 37 pages, 1978.

No. 8 *Federal Mineral Policies: 1945-75*, by M.J. Wojciechowski; 85 pages, 21 tables, 1979. (WP-8, $5.00)

No. 9 *Trends in Canada's Mineral Trade*, by B.W. Wilkinson; 63 pages, 27 tables, 1978. (WP-9, $5.00)

No. 10 *Canada as a World Zinc Producer: Prospects to 1980*, by N.D Olewiler, P.R. Richardson, and L. Rumble; 22 pages, 12 tables, 1978. (WP-10, $5.00)

*No. 11 *A Survey of Resources and a Production Cycle for the Non-ferrous Metals*, by C Lafkas and J.G. Paterson; 44 pages, 9 tables, 1978.

*No. 12 *Solar Energy and the Canadian Mining Sector: A Demand Forecast*, by J.S. Shewchun and D.B. Curtis; 45 pages, 14 tables, 1978. (WP-12, $5.00)

No. 13 *Cerro Colorado: A Case Study of the Role of Canadian Crown Corporations in Foreign Mineral Development*, by C.G. Miller, N.D. Olewiler, and P.R. Richardson; 44 pages, 5 tables, 1979. (WP-13, $5.00)

*No. 14 *The Administration of Mineral Exploration in the Yukon and Northwest Territories*, by K.A. Graham, R.G. McEachern and C.G. Miller; 42 pages, 1979. (WP-14, $5.00)

No. 15 *Public Policy Aspects of Information Exchange in Canadian Mineral Exploration*, by D.O. Downing and B.W. Mackenzie, 52 pages, 1979. (WP-15, $5.00)

No. 16 *Canada's Competitive Position in Copper and Zinc Markets*, by B.W. Mackenzie; 41 pages, 21 tables, 1979. (WP-16, $5.00)

No. 17 *Constitutional Change and the Mineral Industry in Canada*, by Wendy MacDonald; 66 pages, 1979. (WP-17, $5.00)

No. 18 *An Economic Analysis of the Canadian Taxation of an Integrated Mining Company*, by Jean-Thomas Bernard; 112 pages, 1980. (WP-18, $9.00)

*No. 19 *Looking for the Improbable Needle in a Haystack: The Economics of Base Metal Exploration in Canada*, by B.W. Mackenzie, 48 pages, 1980. (WP-19, $5.00)

No. 20 *The Market Price of Risk in the Canadian Mining Industry*, by H.F. Campbell, 29 pages, 1980. (WP-20, $5.00)

No. 21 *Public Affairs and the Minerals Industry: Junior Mining; Northern Development, Loans for Foreign Mines; A Public Relations Strategy*, by C.G. Miller; 42 pages, 1980. (WP-21, $5.00)

No. 22 *Newfoundland Mining Industry: Present Status and Potential for Expansion*, by N.D. Olewiler and C.H. Pye, 208 pages, 83 tables, 1980. (WP-22, $14.00)

No. 23 *Effects of Water Pollution Control Costs on Base Metal Mining in Canada*, by N.A. Papanicolaou and B.W. Mackenzie; 74 pages, 1981. (WP-23, $6.00)

No. 24 *The Costs of Uncertainty: Regulating Health and Safety in the Canadian Uranium Industry*, by I. Robinson; 74 pages, 3 illustrations, 1982. (WP-24, $9.00)

No. 25 *Economic Guidelines for Small Mineral Deposits/Directives conomiques relatives aux petits gisements*, by B.W. Mackenzie and M.L. Bilodeau; 66 pages, 12 tables, 14 illustrations, 1982. (WP-25, $7.00)

No. 26 *Effects of Public Policy on Investment Demand: The Case of Taxation in Canadian Base Metal Mining*, by B.W. Mackenzie and C.H. Pye; 58 pages, 17 tables, 11 illustrations, 1982. (WP-26, $7.00)

*No. 27 *The Prospects for Canadian Uranium*, by S. Salaff; 50 pages, 9 tables, 1983. (WP-27, $7.00)

No. 28 *Economic Mineral Exploration Targets*, by B.W. Mackenzie; 72 pages, 3 tables, 19 illustration, 1984. (WP-28, $7.00)

No. 29 *Dominant Government Firms in an Oligopolistic Industry: The Case of Saskatchewan Potash*, by F. Flatters and N. Olewiler; 43 pages, 3 tables, 1984. (WP-29, $5.00)

No. 30 *Canadian Mineral Policy Formulation: A Case Study of the Adversarial Process*, by David Yudelman, 83 pages, 1984. (WP-30, $6.00)

No. 31 *Federal Policy and the Role of the Public Enterprise in the Mining Sector*, by M.J. Prince and G.B. Doern, 52 pages, 1984. (WP-31, $5.00)

No. 32 *Productivity and Price: The Case of Gold in Ontario*, by A.G. Green, 54 pages, 1984. (WP-32, $5.00)

No. 33 *The Origins of Public Enterprise in the Canadian Mineral Sector: Three Provincial Case Studies*, by M.J. Prince and G.B. Doern, 143 pages, 1984. (WP-33, $14.00)

No. 34 *Mining and the Macdonald Commission: The State of the Industry in the Mid-1980s*, by D. Yudelman, 116 pages, 1985. (WP-34, $12.00)

No. 35 *Effects of Location on the Competitive Position of Mineral Exploration and Development in Canada*, by B.W. Mackenzie, D.W. Davis and M.L. Bilodeau, 88 pages, 1986. (WP-35, $8.00)

No. 36 *Mine Infrastructure and Economic Development in North Australia*, by C. O'Faircheallaigh, 104 pages, 1986. (WP-36, $12.00)

No. 37 *Intergovernmental Mineral Commodity Arrangements*, by W.K. Buck, 70 pages, 1986. (WP-37, $8.00)

No. 38 *Value-Added Taxation: Issues and Impact for Canadian Mines*, by B.J. Dyack, 62 pages, 1986. (WP-38, $7.00)

Discussion Papers

Discussion papers are a special series of short papers with limited distribution commenting on current issues in mineral resource policy. They represent the result of independent research sponsored by CRS and are offered for information and discussion, and represent an attempt to encourage feedback and further research.

**Effects of the November 16, 1978 Budget on Base Metal Mining in Canada: A Challenge for the Provinces and Some Future Concerns*, by Brian W. Mackenzie and Michel L. Bilodeau

**Effects of Recent Mining Taxation Changes in Quebec, Ontario, and Manitoba*, by Brian W. Mackenzie and Michel L. Bilodeau

**Financing of Junior Mining in Canada*, Summary of the Fifth CRS Policy Discussion Seminar, March 28-30, 1979

**New Mining Ventures: The Case for Preserving After-Tax Financing*, by William T. Cannon

**The Proposed Ontario Aggregates Act: Discussion, Evaluation and Recommendations*, by John Swaigen and J.F. Castrilli

**Parametres Economiques de l'Exploration Minerale au Quebec: Vers la Planification et l'Elaboration d'une Politique Minerale*, par M.L. Bilodeau et B.W. Mackenzie

**Effects of Sulphur Dioxide Control Costs on the Canadian Base Metal Mining Sector: A Preliminary Analysis*, by Brian W. Mackenzie

**The Law of the Sea and Canada's Mineral Industry*, by J. Owen Saunders

Technical Papers

*No. 1 *Financing and Stabilization Policies in a Cyclical Industry: The Case of Inco in the Seventies*, by W.T. Cannon, 200 pages, 33 tables, 12 illustrations, 1981. (T-1, $15.00)

No. 2 *Economic Effects of Smelter Controls on the Canadian Nonferrous Mining Industry*, by B.W. Mackenzie and M.L. Bilodeau; 162 pages, 44 tables, 16 illustrations, 1982. (T-2, $15.00)

No. 3 *Secondary Supply of Copper and Ferrous Metals and Canadian Metal Markets*, by K. Stollery, 118 pages, 24 tables, 16 illustrations, 1983. (T-3, $15.00)

No. 4 *Mineral Technology Transfer: Evaluation of the CANMET Pit Slope Project*, by B.W. Mackenzie and R. Pakalnis; 220 pages, 20 tables, 17 illustrations, 1985. (T-4, $20.00)

*No. 5 *Sourcebook for Native Participation in Canadian Mineral Activities*, by M.J. Wojciechowski and K.A. Graham, 165 pages, 1985. (T-5, Free)

No. 6 *Geological Aspects of Mining Productivity: Canada's Base Metal Resources*, by B.W. Mackenzie; 115 pages, 19 tables, 11 illustrations, 1985. (T-6, $10.00)

No. 7 *Innovation in the Mineral Industry: Opportunities and Strategies for Canada*, by M.J. Wojciechowski and P.R. Richardson, 278 pages, 1987. (T-7, $27.00)

Mineral Policy Update

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